REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-31 are presently active in this case, Claims 1, 7, 9, 14, 27, and 31 having been amended by the present amendment.

In the outstanding Official Action, the Specification was objected to as being non-compliant with 37 CFR 1.77(b); Claim 9 was rejected under 35 U.S.C. 112, second paragraph, as being indefinite; Claims 1, 2, 27-28, and 31 were rejected under 35 U.S.C. 102(b) as being anticipated by Bethune et al. (USP 6,188,768, hereinafter "Bethune"); Claim 4 was rejected under 35 U.S.C. 103(a) as being unpatentable over Bethune; Claims 3, 13, and 30 were rejected under 35 U.S.C. 103(a) as being unpatentable over Bethune in view of Lauzon (US Pub 2004/0165808); Claims 5, 7, 14-16, 19, 21, and 23-26 were rejected under 35 U.S.C. 103(a) as being unpatentable over Bethune in view of Blow (USP 5,757,912); Claims 6, 8, and 10 were rejected under 35 U.S.C. 103(a) as being unpatentable over Bethune in view of Blow and further in view of Moeller et al. (USP 6,538,787, hereinafter "Moeller"); Claim 9 was rejected under 35 U.S.C. 103(a) as being unpatentable over Bethune in view of Blow and Moeller and further in view of Lauzon (US Pub. 2004/0165808); Claim 11 was rejected under 35 U.S.C. 103(a) as being unpatentable over Bethune in view of Blow and further in view of Reingand et al. (US Pub. 2003/0058499, hereinafter "Reingand"); Claim 29 was rejected under 35 U.S.C. 103(a) as being unpatentable over Bethune in view of Szafraniec (US Pub. 2002/0122180); and Claims 8-9, 12, 17, 18, 20, and 22 were objected to as being dependent upon a rejected base claim.

Applicants acknowledge with appreciation the indication that Claims 8-9, 12, 17, 18, 20, and 22 include allowable subject matter. However, since Applicants consider that the

amended independent claims are allowable, Claims 8-9, 12, 17, 18, 20, and 22 have presently been maintained in dependent form.

In response to the objection to the specification, appropriate headings have been added to the specification by the present amendment. Accordingly, this ground for objection has been overcome.

In response to the rejection of Claim 9 under 35 USC 112, second para., Claims 7 and 9 have been amended to commonly refer to "a phase modulator" and "the phase modulator," respectively. Accordingly, amended Claim 7 provides antecedent basis for the phrase "said phase modulator" in Claim 9, and the rejection of Claim 9 under 35 USC 112, second para., has been overcome.

In light of the several grounds for rejection based on prior art grounds, the independent claims have been amended to emphasize that the time delay means outputs photons which are temporally separated dependent on whether they originally had the first polarisation or the second polarisation. Support for these changes to the independent Claims is found at page 3 of the application as originally filed, fourth full paragraph. Further, the claims have been clarified to emphasize that the polarisation of the photons is unknown. In view of these changes, the amended claims are believed patentably distinguishing over the cited prior art references for the reasons next discussed.

Bethune discloses a QKD system in which a diode laser 12 outputs mainly horizontally polarised photons. Referring to Bethune's Figure 2, polarising beam splitter 46 ensures that any vertically polarised photons outputted by diode laser 12 are rejected (column 5, lines 7 to 9). The horizontally polarised photons are then converted to photons with a polarised state of +/- 45°. These polarised photons then impinge on beam splitter PBS 1 and are either directed along path (1) into delay line 18 followed by the path to second channel

end 20 and back to PBS 1 path (2) to second channel end 20 then to delay line 18 then to PBS 1. Therefore, although the photons follow two paths through the system, the two paths taught by Bethune are essentially of the same length.

In contrast, the claimed invention addresses the problem of enhancing the efficiency of an unpolarised source. To that end, according to Applicants' invention, photons which are emitted from the source having an unknown polarisation are directed into a time delay means so that those photons whose polarisation is projected onto a first polarisation exit the time delay means at a different time to those photons which enter the time delay means with a second polarisation. Therefore, by temporally separating the photons, it is possible to identify those photons which have a first polarisation and those photons which have the second polarisation. This allows variations on how the equipment reacts to photons with the different polarisation to be taken into account and thus all photons can be theoretically used.

This is not at all taught in Bethune which teaches that any photons which do not have the desirable polarization are discarded so as to produce photons with a known polarisation +/-45° for entry into PBS 1. Thus, Applicants respectfully submit the claimed invention is clearly distinguished over Bethune because Bethune does not suggest a time delay means which delays photons with one polarisation with respect to photons of the other polarisation. The delay line 18 of Bethune delays both photons which follow the first path and the second path since both sets of photons eventually traverse this part section. Further, the polarisation of the photons directed to PBS 1 is known.

In view of these differences, it is respectfully submitted that amended Claim 1 clearly patentably distinguishes over Bethune.

Similar amendments have been made to the quantum communication system Claim 14, which states that the photons having the first polarization are temporally separated from

the photons having the second polarisation on entering the encoding means. In Bethune, delay line 18 is part of the encoding means and photons are encoded in the delay line using PM1. In fact, it is respectfully submitted that the encoding circuit of Bethune starts at PBS 1. Therefore, photons are certainly not temporally separated on entering it. Further, there is no disclosure in Bethune of a delay means before photon entry into the encoding circuit. In view of these differences, it is respectfully submitted that amended Claim 14 likewise clearly patentably distinguishes over Bethune.

For similar reasons, method Claim 27 is believed to be patentably distinguishing as above described with reference to Claim 1.

The secondary references cited in the outstanding grounds for rejection have also been considered but are believed to be no more pertinent that the Bethune reference above discussed.

For example, Lauzon uses an interferometer to convert un-polarised light to polarised light with an efficiency better than that of a polarising filter. The device is shown as figure 1. It is important to note that although this system directs photons with one polarisation along one arm and photons with a different polarisation along the other arm, it has no time delay means in either arm. Therefore, the output for both arms is output at the same time. In the Applicants' invention, it would be impossible to usefully use such a system since photons with original existing polarisations must be treated differently and hence temporally separated.

Blow also describes an QKD system. In figure 5a, a first interferometer splits the laser pulse into two identical ones with a finite delay in between. This is very different to the claimed invention since a fiber coupler is provided at the input to the interferometer. There is no splitting of the pulse due to polarisation.

Moeller describes a system where again there is no time delay between the two paths which photons follow after passing through a polarising beam splitter.

Reingand and Szafraniec appear merely to disclose that polarisation encoding is known, but do not otherwise appear to be relevant to the claimed features stated in the independent claims.

Consequently, in view of the present amendment and in light of the above comments, no further issues are believed to be outstanding, and the present application is believed to be in condition for allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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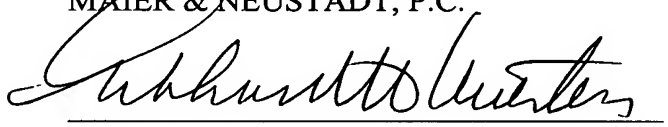

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